

# Data profiling project - Saheli Kar

## Part 1:

I am choosing a data set of Real Estate. The csv file is shared in the GitHub.

```
RealEstateDf<-data1<- read.csv(file.choose(), header=TRUE)
head(RealEstateDf)
```

```
##           street      city  zip state beds  baths
sq__ft      type
## 1      3526 HIGH ST  SACRAMENTO  95838    CA     2     1
836 Residential
## 2       51 OMAHA CT  SACRAMENTO  95823    CA     3     1
1167 Residential
## 3      2796 BRANCH ST  SACRAMENTO  95815    CA     2     1
796 Residential
## 4      2805 JANETTE WAY  SACRAMENTO  95815    CA     2     1
852 Residential
## 5      6001 MCMAHON DR  SACRAMENTO  95824    CA     2     1
797 Residential
## 6  5828 PEPPERMILL CT  SACRAMENTO  95841    CA     3     1
1122 Condo
##           sale_date price latitude longitude
## 1 wed May 21 00:00:00 EDT 2008 59222    38.63    -121.4
## 2 wed May 21 00:00:00 EDT 2008 68212    38.48    -121.4
## 3 wed May 21 00:00:00 EDT 2008 68880    38.62    -121.4
## 4 wed May 21 00:00:00 EDT 2008 69307    38.62    -121.4
## 5 wed May 21 00:00:00 EDT 2008 81900    38.52    -121.4
## 6 wed May 21 00:00:00 EDT 2008 89921    38.66    -121.3
```

## Part 2:

**The variables in the Sacramento Real Estate data sets are:**

**street** - The street address of the property.

**city** - The city where the property is located.

**zip** - The zip code of the property.

**state** - The state where the property is located.

**beds** - The number of bedrooms in the property.

**baths** - The number of bathrooms in the property.

**sq\_\_ft** - The area of the property in square feet.

**type** - The type of the property whether it is Residential/Condominium/ Multifamily

**sale\_date** - The date when the property is sold.

**price** - The price of the property sold.

**latitude** - The latitude location of the property.

**longitude** - The longitude location of the property.

## The correlation of the variables are provided with ggpairs()

```
#install.package(psych)
#require(psych)
#pairs(~zip+beds+baths+sq__ft+type+sale_date+price,
data=RealEstateDf)

install.packages("GGally")
```

```
## Installing package into
'C:/Users/sonatushi/Documents/R/win-library/3.1'
## (as 'lib' is unspecified)
```

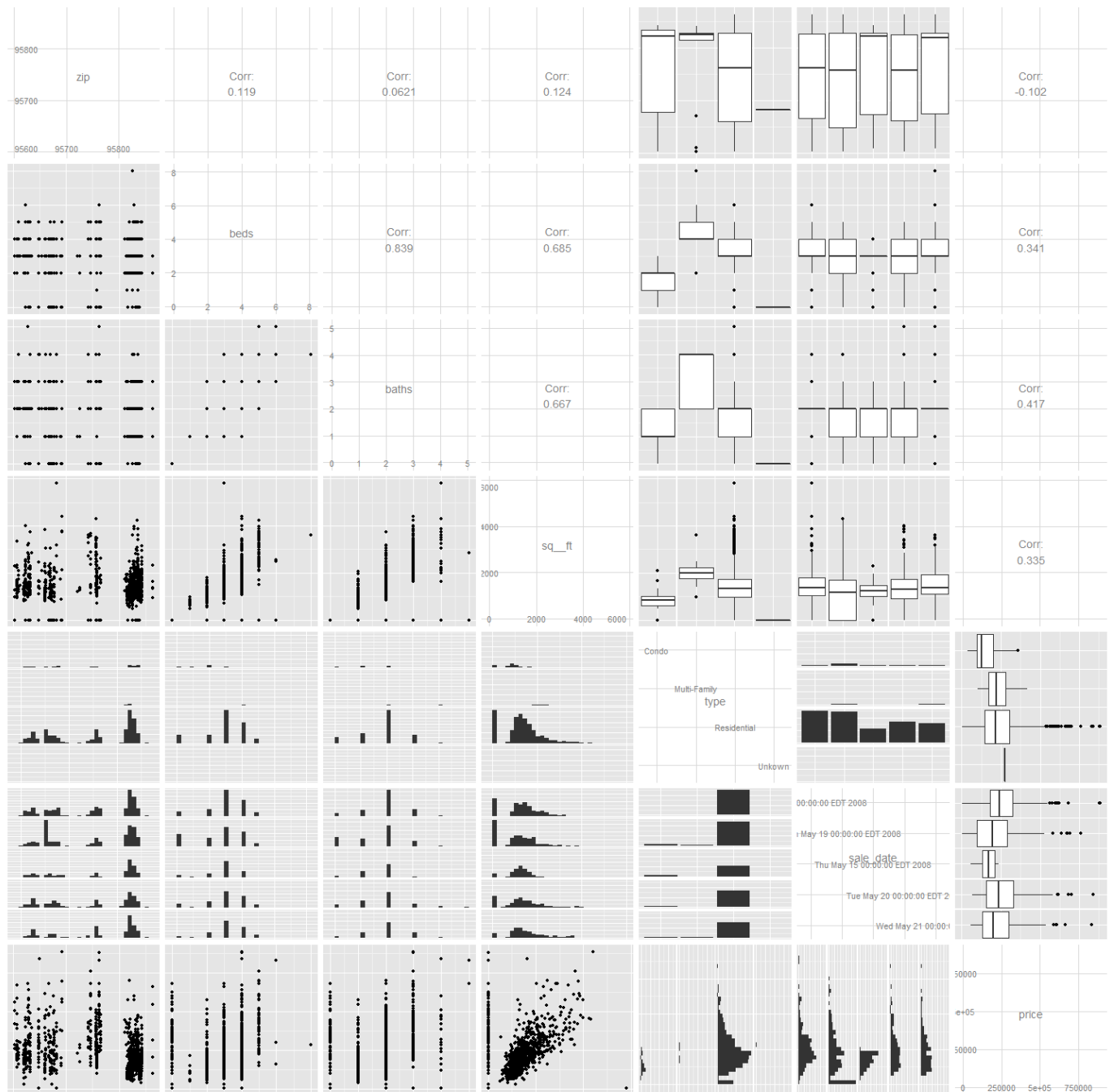
```
## Error: trying to use CRAN without setting a mirror
```

```
require(GGally)
```

```
## Loading required package: GGally
```

```
## warning: package 'GGally' was built under R version 3.1.1
```

```
ggpairs(data=RealEstateDf, columns=c("zip", "beds", "baths",
"sq__ft", "type", "sale_date", "price"))
```



Above we can see the correlation between the variables:  
zip, beds, baths, sq\_\_ft, type, sale\_date, price

Interesting correlation to be noted:

- Most of the 2 and 4 bedrooms property are sold in the areas around the zipcode 95800. Most of the 3 bedrooms are sold in the area with zip code 95600. Only one area had 8 bedrooms on sale.
- Very interesting positive correlation between beds and baths found.
- Also very positive correlation found between sqft and baths; and sqft and beds
- Most of the inexpensive property sold in the area around 95800. While Other areas sold relatively more expensive properties than the area under 95800.

- Most of the properties sold are Residential and most properties are inexpensive.
- Price and sq\_\_ft doesnt hold a spreaded correlation.

## Recoding and binning:

Recoding the price and the sq\_\_ft variable.

```
RealEstateDf$priceCategory[RealEstateDf$price<=100000]<-
"Inexpensive"
RealEstateDf$priceCategory[RealEstateDf$price>100000 &
RealEstateDf$price<=200000]<-"AveragePriced"
RealEstateDf$priceCategory[RealEstateDf$price>200000]<-
"Expensive"

RealEstateDf$AreaCategory[RealEstateDf$sq__ft<1000]<-
"Smaller"
RealEstateDf$AreaCategory[RealEstateDf$sq__ft>1000 &
RealEstateDf$sq__ft<2000] <-"Bigger"
RealEstateDf$AreaCategory[RealEstateDf$sq__ft>2000]<-"Very
Big"

head(RealEstateDf, n=50)
```

##	state	beds	baths	street	city	zip
## 1	CA	2	1	3526 HIGH ST	SACRAMENTO	95838
## 2	CA	3	1	51 OMAHA CT	SACRAMENTO	95823
## 3	CA	2	1	2796 BRANCH ST	SACRAMENTO	95815
## 4	CA	2	1	2805 JANETTE WAY	SACRAMENTO	95815
## 5	CA	2	1	6001 MCMAHON DR	SACRAMENTO	95824
## 6	CA	3	1	5828 PEPPERMILL CT	SACRAMENTO	95841
## 7	CA	3	2	6048 OGDEN NASH WAY	SACRAMENTO	95842
## 8	CA	3	1	2561 19TH AVE	SACRAMENTO	95820
## 9	CA	11150	2	TRINITY RIVER DR Unit 114	RANCHO CORDOVA	95670
## 10	CA	3	2	7325 10TH ST	RIO LINDA	95673
## 11	CA	3	2	645 MORRISON AVE	SACRAMENTO	95838
## 12	CA	3	2	4085 FAWN CIR	SACRAMENTO	95823
## 13	CA	1	1	2930 LA ROSA RD	SACRAMENTO	95815

##	14		2113 KIRK WAY	SACRAMENTO	95822
CA	3	1			
##	15		4533 LOCH HAVEN WAY	SACRAMENTO	95842
CA	2	2			
##	16		7340 HAMDEN PL	SACRAMENTO	95842
CA	2	2			
##	17		6715 6TH ST	RIO LINDA	95673
CA	2	1			
##	18		6236 LONGFORD DR Unit 1	CITRUS HEIGHTS	95621
CA	2	1			
##	19		250 PERALTA AVE	SACRAMENTO	95833
CA	2	1			
##	20		113 LEEWILL AVE	RIO LINDA	95673
CA	3	2			
##	21		6118 STONEHAND AVE	CITRUS HEIGHTS	95621
CA	3	2			
##	22		4882 BANDALIN WAY	SACRAMENTO	95823
CA	4	2			
##	23		7511 OAKVALE CT	NORTH HIGHLANDS	95660
CA	4	2			
##	24		9 PASTURE CT	SACRAMENTO	95834
CA	3	2			
##	25		3729 BAINBRIDGE DR	NORTH HIGHLANDS	95660
CA	3	2			
##	26		3828 BLACKFOOT WAY	ANTELOPE	95843
CA	3	2			
##	27		4108 NORTON WAY	SACRAMENTO	95820
CA	3	1			
##	28		1469 JANRICK AVE	SACRAMENTO	95832
CA	3	2			
##	29		9861 CULP WAY	SACRAMENTO	95827
CA	4	2			
##	30		7825 CREEK VALLEY CIR	SACRAMENTO	95828
CA	3	2			
##	31	5201	LAGUNA OAKS DR Unit 140	ELK GROVE	95758
CA	2	2			
##	32		6768 MEDORA DR	NORTH HIGHLANDS	95660
CA	3	2			
##	33		3100 EXPLORER DR	SACRAMENTO	95827
CA	3	2			
##	34		7944 DOMINION WAY	ELVERTA	95626
CA	3	2			
##	35	5201	LAGUNA OAKS DR Unit 162	ELK GROVE	95758
CA	2	2			
##	36		3920 SHINING STAR DR	SACRAMENTO	95823
CA	3	2			
##	37		5031 CORVAIR ST	NORTH HIGHLANDS	95660
CA	3	2			
##	38		7661 NIXOS WAY	SACRAMENTO	95823
CA	4	2			
##	39		7044 CARTHY WAY	SACRAMENTO	95828
CA	4	2			
##	40		2442 LARKSPUR LN	SACRAMENTO	95825
CA	1	1			
##	41		4800 WESTLAKE PKWY Unit 2109	SACRAMENTO	95835

CA	2	2						
##	42		2178 63RD AVE	SACRAMENTO	95822			
CA	3	2						
##	43		8718 ELK WAY	ELK GROVE	95624			
CA	3	2						
##	44		5708 RIDGEPOINT DR	ANTELOPE	95843			
CA	2	2						
##	45		7315 KOALA CT NORTH HIGHLANDS	95660				
CA	4	2						
##	46		2622 ERIN DR	SACRAMENTO	95833			
CA	4	1						
##	47		8421 SUNBLAZE WAY	SACRAMENTO	95823			
CA	4	2						
##	48		7420 ALIX PKWY	SACRAMENTO	95823			
CA	4	1						
##	49		3820 NATOMA WAY	SACRAMENTO	95838			
CA	4	2						
##	50		4431 GREEN TREE DR	SACRAMENTO	95823			
CA	3	2						
##	sq__ft		type	sale_date	price			
latitude								
##	1	836	Residential	wed May 21 00:00:00 EDT 2008	59222			
38.63								
##	2	1167	Residential	wed May 21 00:00:00 EDT 2008	68212			
38.48								
##	3	796	Residential	wed May 21 00:00:00 EDT 2008	68880			
38.62								
##	4	852	Residential	wed May 21 00:00:00 EDT 2008	69307			
38.62								
##	5	797	Residential	wed May 21 00:00:00 EDT 2008	81900			
38.52								
##	6	1122	Condo	wed May 21 00:00:00 EDT 2008	89921			
38.66								
##	7	1104	Residential	wed May 21 00:00:00 EDT 2008	90895			
38.68								
##	8	1177	Residential	wed May 21 00:00:00 EDT 2008	91002			
38.54								
##	9	941	Condo	wed May 21 00:00:00 EDT 2008	94905			
38.62								
##	10	1146	Residential	wed May 21 00:00:00 EDT 2008	98937			
38.70								
##	11	909	Residential	wed May 21 00:00:00 EDT 2008	100309			
38.64								
##	12	1289	Residential	wed May 21 00:00:00 EDT 2008	106250			
38.47								
##	13	871	Residential	wed May 21 00:00:00 EDT 2008	106852			
38.62								
##	14	1020	Residential	wed May 21 00:00:00 EDT 2008	107502			
38.48								
##	15	1022	Residential	wed May 21 00:00:00 EDT 2008	108750			
38.67								
##	16	1134	Condo	wed May 21 00:00:00 EDT 2008	110700			
38.70								
##	17	844	Residential	wed May 21 00:00:00 EDT 2008	113263			
38.69								

## 18	795	Condo	wed	May	21	00:00:00	EDT	2008	116250
38.68									
## 19	588	Residential	wed	May	21	00:00:00	EDT	2008	120000
38.61									
## 20	1356	Residential	wed	May	21	00:00:00	EDT	2008	121630
38.69									
## 21	1118	Residential	wed	May	21	00:00:00	EDT	2008	122000
38.71									
## 22	1329	Residential	wed	May	21	00:00:00	EDT	2008	122682
38.47									
## 23	1240	Residential	wed	May	21	00:00:00	EDT	2008	123000
38.70									
## 24	1601	Residential	wed	May	21	00:00:00	EDT	2008	124100
38.63									
## 25	901	Residential	wed	May	21	00:00:00	EDT	2008	125000
38.70									
## 26	1088	Residential	wed	May	21	00:00:00	EDT	2008	126640
38.71									
## 27	963	Residential	wed	May	21	00:00:00	EDT	2008	127281
38.54									
## 28	1119	Residential	wed	May	21	00:00:00	EDT	2008	129000
38.48									
## 29	1380	Residential	wed	May	21	00:00:00	EDT	2008	131200
38.56									
## 30	1248	Residential	wed	May	21	00:00:00	EDT	2008	132000
38.47									
## 31	1039	Condo	wed	May	21	00:00:00	EDT	2008	133000
38.42									
## 32	1152	Residential	wed	May	21	00:00:00	EDT	2008	134555
38.69									
## 33	1380	Residential	wed	May	21	00:00:00	EDT	2008	136500
38.57									
## 34	1116	Residential	wed	May	21	00:00:00	EDT	2008	138750
38.71									
## 35	1039	Condo	wed	May	21	00:00:00	EDT	2008	141000
38.42									
## 36	1418	Residential	wed	May	21	00:00:00	EDT	2008	146250
38.49									
## 37	1082	Residential	wed	May	21	00:00:00	EDT	2008	147308
38.66									
## 38	1472	Residential	wed	May	21	00:00:00	EDT	2008	148750
38.48									
## 39	1146	Residential	wed	May	21	00:00:00	EDT	2008	149593
38.50									
## 40	760	Condo	wed	May	21	00:00:00	EDT	2008	150000
38.59									
## 41	1304	Condo	wed	May	21	00:00:00	EDT	2008	152000
38.66									
## 42	1207	Residential	wed	May	21	00:00:00	EDT	2008	154000
38.49									
## 43	1056	Residential	wed	May	21	00:00:00	EDT	2008	156896
38.42									
## 44	1043	Residential	wed	May	21	00:00:00	EDT	2008	161250
38.72									
## 45	1587	Residential	wed	May	21	00:00:00	EDT	2008	161500

```

38.70
## 46 1120 Residential Wed May 21 00:00:00 EDT 2008 164000
38.61
## 47 1580 Residential Wed May 21 00:00:00 EDT 2008 165000
38.45
## 48 1955 Residential Wed May 21 00:00:00 EDT 2008 166357
38.49
## 49 1656 Residential Wed May 21 00:00:00 EDT 2008 166357
38.64
## 50 1477 Residential Wed May 21 00:00:00 EDT 2008 168000
38.50
## longitude priceCategory AreaCategory
## 1 -121.4 Inexpensive Smaller
## 2 -121.4 Inexpensive Bigger
## 3 -121.4 Inexpensive Smaller
## 4 -121.4 Inexpensive Smaller
## 5 -121.4 Inexpensive Smaller
## 6 -121.3 Inexpensive Bigger
## 7 -121.4 Inexpensive Bigger
## 8 -121.5 Inexpensive Bigger
## 9 -121.3 Inexpensive Smaller
## 10 -121.4 Inexpensive Bigger
## 11 -121.5 AveragePriced Smaller
## 12 -121.5 AveragePriced Bigger
## 13 -121.4 AveragePriced Smaller
## 14 -121.5 AveragePriced Bigger
## 15 -121.4 AveragePriced Bigger
## 16 -121.4 AveragePriced Bigger
## 17 -121.5 AveragePriced Smaller
## 18 -121.3 AveragePriced Smaller
## 19 -121.5 AveragePriced Smaller
## 20 -121.5 AveragePriced Bigger
## 21 -121.3 AveragePriced Bigger
## 22 -121.4 AveragePriced Bigger
## 23 -121.4 AveragePriced Bigger
## 24 -121.5 AveragePriced Bigger
## 25 -121.4 AveragePriced Smaller
## 26 -121.4 AveragePriced Bigger
## 27 -121.5 AveragePriced Smaller
## 28 -121.5 AveragePriced Bigger
## 29 -121.3 AveragePriced Bigger
## 30 -121.4 AveragePriced Bigger
## 31 -121.4 AveragePriced Bigger
## 32 -121.4 AveragePriced Bigger
## 33 -121.3 AveragePriced Bigger
## 34 -121.4 AveragePriced Bigger
## 35 -121.4 AveragePriced Bigger
## 36 -121.5 AveragePriced Bigger
## 37 -121.4 AveragePriced Bigger
## 38 -121.5 AveragePriced Bigger
## 39 -121.4 AveragePriced Bigger
## 40 -121.4 AveragePriced Smaller
## 41 -121.5 AveragePriced Bigger
## 42 -121.5 AveragePriced Bigger
## 43 -121.4 AveragePriced Bigger

```



```
## 44      -121.3 AveragePriced      Bigger
## 45      -121.4 AveragePriced      Bigger
## 46      -121.5 AveragePriced      Bigger
## 47      -121.4 AveragePriced      Bigger
## 48      -121.5 AveragePriced      Bigger
## 49      -121.4 AveragePriced      Bigger
## 50      -121.5 AveragePriced      Bigger
```

## Frequency of the Price Category with respect to the cities

```
require(dplyr)
```

```
## Loading required package: dplyr
```

```
## Warning: package 'dplyr' was built under R version 3.1.1
```

```
##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:stats':
##
##   filter, lag
##
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

```
priceCategoryFreq<-select(RealEstateDf, city, priceCategory)
%>%
group_by(city, priceCategory) %>%
summarise(count=n())

show(priceCategoryFreq)
```

```
## Source: local data frame [64 x 3]
## Groups: city
##
##           city priceCategory count
## 1     ANTELOPE AveragePriced    12
## 2     ANTELOPE   Expensive    21
## 3     AUBURN   Expensive      5
## 4 CAMERON PARK AveragePriced     2
## 5 CAMERON PARK   Expensive      7
## 6  CARMICHAEL AveragePriced     5
## 7  CARMICHAEL   Expensive    15
## 8 CITRUS HEIGHTS AveragePriced    20
## 9 CITRUS HEIGHTS   Expensive    13
```

## 10	CITRUS HEIGHTS	Inexpensive	2
## 11	COOL	Expensive	1
## 12	DIAMOND SPRINGS	Expensive	1
## 13	EL DORADO	Expensive	2
## 14	EL DORADO HILLS	Expensive	23
## 15	ELK GROVE	AveragePriced	19
## 16	ELK GROVE	Expensive	92
## 17	ELK GROVE	Inexpensive	3
## 18	ELVERTA	AveragePriced	4
## 19	FAIR OAKS	AveragePriced	4
## 20	FAIR OAKS	Expensive	5
## 21	FOLSOM	AveragePriced	1
## 22	FOLSOM	Expensive	16
## 23	FORESTHILL	AveragePriced	1
## 24	GALT	AveragePriced	9
## 25	GALT	Expensive	13
## 26	GARDEN VALLEY	Expensive	1
## 27	GOLD RIVER	Expensive	4
## 28	GRANITE BAY	Expensive	3
## 29	GREENWOOD	Expensive	1
## 30	LINCOLN	AveragePriced	3
## 31	LINCOLN	Expensive	19
## 32	LINCOLN	Inexpensive	50
## 33	LOOMIS	Expensive	2
## 34	MATHER	Expensive	1
## 35	MEADOW VISTA	Expensive	1
## 36	NORTH HIGHLANDS	AveragePriced	18
## 37	NORTH HIGHLANDS	Expensive	2
## 38	NORTH HIGHLANDS	Inexpensive	1
## 39	ORANGEVALE	AveragePriced	2
## 40	ORANGEVALE	Expensive	9
## 41	PENRYN	Expensive	1
## 42	PLACERVILLE	Expensive	10
## 43	POLLOCK PINES	AveragePriced	1
## 44	POLLOCK PINES	Expensive	2
## 45	RANCHO CORDOVA	AveragePriced	8
## 46	RANCHO CORDOVA	Expensive	19
## 47	RANCHO CORDOVA	Inexpensive	1
## 48	RANCHO MURIETA	Expensive	2
## 49	RANCHO MURIETA	Inexpensive	1
## 50	RIO LINDA	AveragePriced	6
## 51	RIO LINDA	Expensive	5
## 52	RIO LINDA	Inexpensive	3
## 53	ROCKLIN	Expensive	17
## 54	ROSEVILLE	AveragePriced	10
## 55	ROSEVILLE	Expensive	38
## 56	SACRAMENTO	AveragePriced	200
## 57	SACRAMENTO	Expensive	182
## 58	SACRAMENTO	Inexpensive	70
## 59	SHINGLE SPRINGS	Expensive	1
## 60	SLOUGHHOUSE	Inexpensive	1
## 61	WALNUT GROVE	Expensive	1
## 62	WEST SACRAMENTO	AveragePriced	2
## 63	WEST SACRAMENTO	Expensive	1
## 64	WILTON	Expensive	5

## Frequency of the Area Category with respect to the cities

```
require(dplyr)

areaCategoryFreq<-select(RealEstateDf, city, AreaCategory)
%>%
group_by(city,AreaCategory) %>%
summarise(count=n())

show(areaCategoryFreq)
```

```
## Source: local data frame [79 x 3]
## Groups: city
##
##           city AreaCategory count
## 1      ANTELOPE      Bigger     22
## 2      ANTELOPE    Smaller      2
## 3      ANTELOPE  Very Big      9
## 4      AUBURN      Bigger      1
## 5      AUBURN    Smaller      3
## 6      AUBURN  Very Big      1
## 7 CAMERON PARK    Smaller      8
## 8 CAMERON PARK  Very Big      1
## 9  CARMICHAEL      Bigger     14
## 10 CARMICHAEL    Smaller      2
## 11 CARMICHAEL  Very Big      3
## 12 CARMICHAEL      NA        1
## 13 CITRUS HEIGHTS      Bigger     31
## 14 CITRUS HEIGHTS    Smaller      3
## 15 CITRUS HEIGHTS  Very Big      1
## 16      COOL      Bigger      1
## 17 DIAMOND SPRINGS      Bigger      1
## 18      EL DORADO      Bigger      2
## 19 EL DORADO HILLS      Bigger      2
## 20 EL DORADO HILLS    Smaller     20
## 21 EL DORADO HILLS  Very Big      1
## 22      ELK GROVE      Bigger     61
## 23      ELK GROVE    Smaller     10
## 24      ELK GROVE  Very Big     43
## 25      ELVERTA      Bigger      4
## 26  FAIR OAKS      Bigger      5
## 27  FAIR OAKS    Smaller      2
## 28  FAIR OAKS  Very Big      2
## 29      FOLSOM      Bigger      7
## 30      FOLSOM    Smaller      2
## 31      FOLSOM  Very Big      8
## 32  FORESTHILL    Smaller      1
## 33      GALT      Bigger     17
## 34      GALT    Smaller      1
## 35      GALT  Very Big      4
```

## 36	GARDEN VALLEY	Smaller	1
## 37	GOLD RIVER	Bigger	2
## 38	GOLD RIVER	Smaller	1
## 39	GOLD RIVER	Very Big	1
## 40	GRANITE BAY	Very Big	3
## 41	GREENWOOD	Very Big	1
## 42	LINCOLN	Bigger	5
## 43	LINCOLN	Smaller	66
## 44	LINCOLN	Very Big	1
## 45	LOOMIS	Bigger	2
## 46	MATHER	Very Big	1
## 47	MEADOW VISTA	Bigger	1
## 48	NORTH HIGHLANDS	Bigger	16
## 49	NORTH HIGHLANDS	Smaller	5
## 50	ORANGEVALE	Bigger	9
## 51	ORANGEVALE	Very Big	2
## 52	PENRYN	Bigger	1
## 53	PLACERVILLE	Bigger	2
## 54	PLACERVILLE	Smaller	6
## 55	PLACERVILLE	Very Big	2
## 56	POLLOCK PINES	Bigger	3
## 57	RANCHO CORDOVA	Bigger	11
## 58	RANCHO CORDOVA	Smaller	9
## 59	RANCHO CORDOVA	Very Big	7
## 60	RANCHO CORDOVA	NA	1
## 61	RANCHO MURIETA	Smaller	1
## 62	RANCHO MURIETA	Very Big	2
## 63	RIO LINDA	Bigger	11
## 64	RIO LINDA	Smaller	3
## 65	ROCKLIN	Bigger	6
## 66	ROCKLIN	Smaller	9
## 67	ROCKLIN	Very Big	2
## 68	ROSEVILLE	Bigger	14
## 69	ROSEVILLE	Smaller	24
## 70	ROSEVILLE	Very Big	10
## 71	SACRAMENTO	Bigger	308
## 72	SACRAMENTO	Smaller	94
## 73	SACRAMENTO	Very Big	50
## 74	SHINGLE SPRINGS	Smaller	1
## 75	SLOUGHHOUSE	Very Big	1
## 76	WALNUT GROVE	Bigger	1
## 77	WEST SACRAMENTO	Smaller	3
## 78	WILTON	Smaller	1
## 79	WILTON	Very Big	4

## Distribution of property prices with respect to longitude and latitude

```
require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
## warning: package 'ggplot2' was built under R version 3.1.1
```

```
require(reshape)
```

```
## Loading required package: reshape
```

```
require(gridExtra)
```

```
## Loading required package: gridExtra
```

```
## warning: package 'gridExtra' was built under R version 3.1.1
```

```
## Loading required package: grid
```

```
longitudeMap<-ggplot(data = RealEstateDf) +  
geom_point(aes(x=longitude, y=priceCategory ))+  
ggtitle("Distribution of property prices with respect to  
longitude")
```

```
latitudeMap<-ggplot(data = RealEstateDf) +  
geom_point(aes(x=latitude, y=priceCategory ))+  
ggtitle("Distribution of property prices with respect to  
latitude")
```

```
grid.arrange(longitudeMap,latitudeMap, ncol=1 )
```

